

REMARKS

Claims 1-26 are pending in this application. Claim 1 is the sole independent claim. By this Amendment, claim1 is amended and claim 26 is added. No new matter is added.

Drawing Objection

The drawings are objected to for allegedly failing to show every feature recited in the claims. Specifically, it is alleged that the “coolant flowing through a stator cooling ring of the electric submarine drive motor” in claim 1 is not shown.

As claim 1 is amended in response to the objection to the drawing, withdrawal of the objection is respectfully requested.

Claim Rejections

Rejections under 35 U.S.C. §102

Claims 1 and 10 stand rejected under 35 U.S.C. §102(b) as being anticipated by “Four-Circuit DC Motor For Submarine Propulsion” by Heine, et al. (Heine). The rejection is respectfully traversed.

Heine fails to disclose each and every feature recited in the rejected claims. For example, Heine fails to disclose, a redundant cooling device for an electric submarine drive motor, comprising a first liquid cooling circuit and a second liquid cooling circuit, adapted to transport thermal energy away from the electric submarine drive motor, wherein the first liquid cooling circuit and the second liquid cooling circuit are adapted to flow a liquid coolant in a counter-current through a stator cooling ring of the electric submarine drive motor, in a region of the electric submarine drive motor, as recited in amended independent claim 1.

Heine relates to a four-circuit DC motor for submarine propulsion that is cooled by circulating air around the windings and the commutator. The flow of the cooling air is illustrated in Fig. 9 which shows a fan for moving the air around the commutator and a fan for moving air around the winding, respectively. Thus, Heine clearly fails to disclose or suggest flowing a liquid coolant through a stator cooling ring of the submarine motor, as recited in independent claim 1.

As Heine fails to disclose the features recited in the rejected claims, withdrawal of the rejection is respectfully requested.

Rejections Under 35 U.S.C. §103

Claims 2, 4, 5, 11 and 19 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Heine in view of U.S. Patent No. 4,313,309 ("Lehman"). The rejection is respectfully traversed.

In addition to the above described deficiencies of Heine, it is admitted in the Office Action that Heine also fails to disclose or suggest the additional features of claims 2, 4, 5 11 and 19. In an effort to overcome the admitted deficiencies, it is alleged that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Heine with the teachings of Lehman. For example, in rejecting claim 2, it is alleged that it would have been obvious to modify Heine to include the high and low stage compressors of Lehman.

Lehman relates to a two-stage refrigerator used for medicine which has a high stage compressor 32 and low stage compressor 20. To obtain very low temperatures in the freezer compartment 10, two separate refrigeration systems are utilized, namely a so-called "high stage" and a "low stage." Both stages, as is well understood, provide refrigerant compression and evaporation phase changes in order to produce a refrigerating effect. The high stage refrigeration system produces these refrigerant phase changes at comparatively high temperatures, whereas the low stage refrigeration system provides these phase changes at considerably lower temperatures. More particularly, it is the low stage refrigeration system which is effective in causing an evaporation phase change in the refrigerant at significantly low temperature, which is primarily responsible for the corresponding low temperature produced by this refrigerant in the freezer compartment 10.

As illustrated in FIG. 2 a control unit 52, which is operated by the temperature-sensitive probe 48, is electrically connected to the conductor 44 of the compressors 20 and 32 for both of the two refrigeration systems involved. Thus, when the probe 48 indicates a low enough operating temperature within compartment 10 so that operation of the low stage compressor 20 can be dispensed with, operation of the high stage compressor 32 will be temporarily discontinued. When the operation of the high stage compressor 32 is thus terminated this, of course, eliminates the condenser coils 38 as a source of heat, and thus effectively obviates the adverse consequences.

Thus, there is no motivation or suggestion to combine the teachings of a two-stage refrigerator with the claimed coolant device for a submarine engine. Moreover, one of skill in the art would not modify the air cooling system of Heine to include the compressors of Lehman because the refrigerant compressors of Lehman would not operate to move the cooling air of Heine.

Regarding claims 4 and 5, it is alleged that the claims are obvious because Lehman discloses that the compressors 20 and 32 “can be turned on and off.” Applicants fail to understand the relevance of this reason for rejecting claims 4 and 5 which recite for example, that “each cooling circuit is operable in a low speed range of the electric submarine drive motor, exclusively by the use of the minor pump assigned thereto.” As turning a refrigerator compressor on and off has no relevance to an operating speed of a submarine drive motor Lehman fails to disclose or suggest the additional features of claims 4 and 5.

As the combination of references fails to render claims 2, 4, 5, 11 and 19 obvious, withdrawal of the rejection is respectfully requested.

Claims 12-14, 16 and 22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Heine and Lehman in view of U.S. Patent No. 5,196,746 (“McCabria”); claim 20 stands rejected over 35 U.S.C. §103(a) as being unpatentable over Heine and Lehman in view of U.S. Patent No. 4,766,557 (“Twerdochlib”); claims 3, 5, 15, 24 and 25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Heine and Lehman in view of U.S. Patent No. 3,089,969 (“Wiedemann”); claims 6, 8, 17 and 21 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Heine in view of U.S. Patent No. 6,901,765 (“Amaral et al.”); claim 7 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Heine and Amaral in view of Lehman; claims 9 and 17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Heine in view of U.S. Patent No. 6,596,175 (“Rowe”); claim 18 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Heine and Twerdochlib; and claim 23 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Heine in view of U.S. Patent No. 4,916,341 (“Mantovani”). The rejections are respectfully traversed.

None of the applied references, whether considered alone or in combination, disclose or suggest each and every feature recited in the rejected claims. Further, claims 2-9 and 11-25 are allowable for their dependency on independent claim 1 for the reasons discussed above, as well

as for the additional features recited therein. Moreover, none of Lehman, McCabria, Twerdochlib, Wiedemann, Amaral, Rowe, or Mantovani overcome the deficiencies of Heine.

For example, McCabria, used to reject claims 12-14, 16 and 22, relates to cooling and lubrication systems for aircraft generators. Thus, McCabria fails to relate in any way or disclose or suggest an electric submarine drive motor as recited in the rejected claims. Further, one of ordinary skill in the art would not seek to modify the submarine engine cooling system of Heine with the generator cooling and lubrication system for an aircraft generator of McCabria as there is no suggestion or motivation to do so in either of the references or in the general knowledge of those of skill in the art.

In rejecting claim 20, it is alleged in the Office Action that it would have been obvious to one of ordinary skill in the art to further combine the teachings of Twerdochlib with Heine and Lehman. The applied reference of Twerdochlib relates to an apparatus which can detect a cracked stator coil, or other portion of a stator coil water cooling system used in electric generators that are driven by steam turbines. Thus, the additional reference of Twerdochlib fails to disclose or suggest an electric submarine drive motor. Moreover, one of skill in the art would not look to the teachings of Twerdochlib to modify Heine as the references relate to disparate art and seek to resolve different problems.

Wiedemann, used to reject claims 3, 5, 15, 24 and 25, relates to an electric turbo generator and a cooling system for the electric turbo generator. Thus, the supplemental reference of Wiedemann also fails to disclose or suggest an electric submarine drive motor and, therefore, fails to overcome the deficiencies of Heine and Lehman. Further, there is no motivation or suggestion in Wiedemann or in the general knowledge of those of skill in the art to modify Heine with the teachings of an electrical turbo generator as taught by Wiedemann.

Amaral, used to reject claims 6, 8, 17 and 21 in combination with Heine, relates to a temperature regulation apparatus for a motor vehicle, such as an air conditioner in a car. Thus, Amaral fails to disclose or suggest an electric submarine drive motor. Moreover, there is no motivation or suggestion to modify the electric submarine drive motor of Heine with the teachings of the car air conditioner described in Amaral.

Amaral is also used to reject claim 7 in combination with Heine and Lehman. However, as discussed above, the combination of references fail to relate in anyway to a submarine drive motor, nor are they combinable.

Rowe, used to reject claims 9 and 17 in combination with Heine, relates to liquid cooling systems for large industrial electric power generators that have liquid cooled stators. As such, Rowe fails to disclose or suggest an electric submarine drive motor. Also, there is no suggestion or motivation to modify Heine with a stator cooling system for an industrial electrical power generator.

Claim 18 is rejected as being unpatentable over the combination of Heine and Twerdochlib. However, as discussed above, neither of the references relates in any way to an electric submarine drive motor and are not combinable.

Mantovani, used to reject claim 23 in combination with Heine, relates to an electric arbor that is integrated with an induction motor for high performance uses. As such, Mantovani fails to disclose or suggest a submarine electric drive motor. Moreover, there is no suggestion or motivation to combine the references as suggested in the Office Action.

Applicants respectfully remind the Examiner that marine and/or naval vehicles are subject to very specific safety requirements and, therefore, have a design that fundamentally differs from that of fixed installations on land. As such, the application of such references in rejected the present claims is inappropriate when examining the present claims. As none of the applied references disclose or suggest the features recited in the rejected claims, withdrawal of the rejections is respectfully requested.

New Claim

None of the references, whether considered alone or in combination, disclose or suggest that the first cooling circuit and the second cooling circuit are identical cooling loops having and have a same capacity, as recited in new claim 26.

CONCLUSION

In view of the above remarks and amendments, Applicants respectfully submit that each of the rejections has been addressed and overcome, placing the present application in condition for allowance. A notice to that effect is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to contact the undersigned.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John W. Fitzpatrick at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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By


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